Permutations:

10 n – # to choose from

3 r – how many you choose

Formula:

$$\frac{n!}{(n-r)!}$$

example: You have 10 numbers 0-9 make a lock combination with 3 numbers.

n^r → 10^3

$10 \cdot 10 \cdot 10$

$$\frac{10!}{7!}$$

$$\frac{10 \cdot 9 \cdot 8 \cdot \cancel{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}{\cancel{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}$$

Combinations: The number of ways to select items from a larger set.

Example: Choose a committee of 3 students from 5 volunteers.

Formula: $_{n}C_{r} = \frac{_{n}P_{r}}{r!} = \frac{n!}{r!(n-r)!}$

$_{5}C_{3}$

MATH

PRB

$_{n}C_{r}$ 5 $_{n}C_{r}$ 3

$_{n}P_{r}$ =

!

$$\frac{5!}{3!(2)!}$$

$$\frac{5 \cdot 4 \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{\cancel{3} \cdot \cancel{2} \cdot \cancel{1}(2 \cdot 1)} \quad \frac{20}{2}$$

10

Counting with Repetition:

Order does not matter. Things can be used more than once.

$$\frac{n!}{(m!)(t!)}$$

n - total things

m - repeating letters

t -

m = 3 (S)

t = 2 (C)

Example: How many code words can be made using the word SUCCESS?

$$\frac{7!}{(3!)(2!)} = 420$$

Factorial: the product of an integer and all integer below it.

Example: $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

Symbol - $n!$

$20! = 20 \cdot 19 \cdot 18 \cdot \ldots \cdot 2 \cdot 1$